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THE EFFECTS OF SOAK TEMPERATURE ON SUGAR MAPLE SEED GERMINATION

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Abstract. The temperature at which sugar maple seeds were soaked before stratification significantly influenced their germination. Maximal germination was obtained when seeds were soaked at 4°C, but if seeds were soaked at 25°C, germination decreased and the stratification requirement increased.

Introduction

Cold, moist stratification is the standard treatment for overcoming dormancy in sugar maple (*Acer saccharum* Marsh.) seeds.

A significant portion of the stratification period is required for water uptake (Webb and Dumbroff 1969, Janerette 1977).

When sugar maple seeds were soaked in water for periods up to 28 days before stratification, germination proceeded more rapidly, with 14 days being the optimum soak time (Janerette 1978b).

This study was conducted to determine the effects of soak temperature on germination.

Materials and Methods

Three lots of sugar maple fruits with a germination potential of at least 98 percent were collected from separate trees and dried to 10 percent moisture content. Filled fruits were separated from empty ones by floatation in pentane (Carl and Yawney 1969) and stored in sealed plastic bags at −10°C. All references to seeds refer to those enclosed in the fruit.

Three replicates of 50 seeds each were loosely placed in cheesecloth bundles and soaked for 14 days in distilled water at 4°C or 25°C.

After being soaked, the seeds were placed inside a moistened, folded, paper towel that was covered with aluminum foil (Janerette 1978a) and were stratified at 4°C for periods up to 90 days.

The emergence of the radicle through the pericarp was used as an indication of germination.

The experiment was repeated later, and the results of both trials were combined.

Results and Discussion

The temperature during imbibition significantly influenced germination. When seeds were presoaked at the higher temperature, their stratification requirement increased and the number of seeds that germinated decreased (Fig. 1). Seeds soaked at 25°C were covered with fungal mycelia, and most of the ungerminated seeds were dead. High-temperature soaks appear to promote microbial growth, and, once stimulated, these organisms thrive even though the seeds are held at low temperatures after soaking.

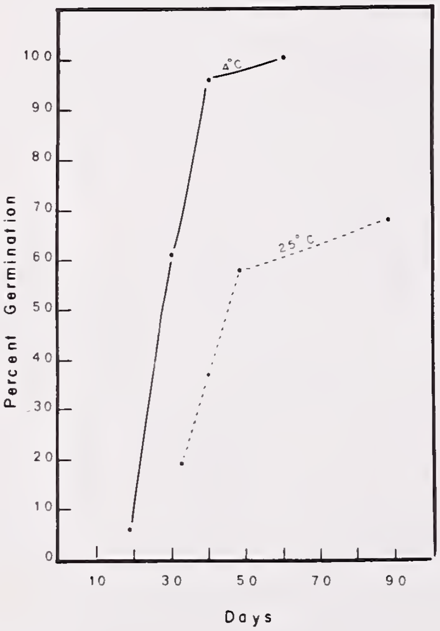

Figure 1.—Germination profile of sugar maple seeds soaked in water at 4°C or 25°C and then stratified at 4°C.

Hendricks and Taylorson (1976) associated the effects of high temperatures with changes in the permeability of seed membranes that result in a loss of material from the seed. When sugar maple seeds were soaked at 25°C, there was a heavy precipitate in the soak water that was absent when seeds were soaked at 4°C.

It seems likely that the detrimental effects of soaking sugar maple seeds at high temperatures can be attributed to a complex of factors including microbial destruction, permeability changes that cause leakage of cellular materials, and an effect on the metabolic mechanism that requires chilling.

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